



COMDTNOTE 16500

JUN 27 1994

COMMANDANT NOTICE 16500

CANCELLED: JUN 27 1995

Subj: CH-10 TO AIDS TO NAVIGATION MANUAL - ADMINISTRATION,  
COMDTINST M16500.7

1. **PURPOSE.** This notice updates Chapters 3, 4 and 7 of the Aids to Navigation Manual - Administration.
2. **ACTION.** Area and district commanders, commanders of maintenance and logistics commands, commanding officers of headquarters units and Commander, Coast Guard Activities Europe shall ensure that the required page replacement is made for this change.
3. **SUMMARY.** Articles which have been changed or modified by this change are indicated by a vertical line in the margin. Purely editorial changes which do not change the meaning are not marked. Major changes are summarized below:
  - a. **Chapter 3** - Section C, has been modified to increase command review of Waterway Analysis and Management System (WAMS) reports.
  - a. **Chapter 4** - Section D, has been modified as a result of findings from the investigation of the Amtrack derailment in Alabama in November 1993. It directs ATON personnel to pay careful attention to all bridges over waterways where there is any possibility for waterborne traffic to transit.
  - b. **Chapter 7** - Section C, gives unit personnel more discretion for scheduling routine visits to aids. A Servicing Interval Flowchart (SIF) has been included to assist in the determination of the intervals between visits. Also, intervals between routine inspection visits of buoys, daybeacons and minor lights have been increased. All waterways must be visited at least annually to assess overall functioning of waterway ATON.

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4. PROCEDURES.

- a. Remove and insert the following pages:

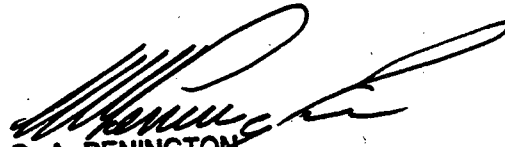
Remove

Insert

Pages 3-13 thru 3-14, CH-9...Pages 3-13 thru 3-14, CH-10  
Pages 4-21 thru 4-24, CH-9...Pages 4-21 thru 4-24, CH-10  
Pages 7-1 thru 7-7, CH-6.....Pages 7-1 thru 7-10, CH-10

- b. Units that have not received COMDTINST M16500.7, but have received this change may requisition a copy of COMDTINST M16500.7 and Changes 7, 8, & 9 from the DOT Warehouse in accordance with COMDTNOTE 5600; Directives, Publications and Reports Index.

5. REPORTS AND FORMS REQUIRED. A new ATON Servicing Interval Flowchart (SIF), is enclosed herewith. The SIF should be reproduced locally and maintained in the aid file.



G. A. PENINGTON  
Chief, Office of Navigation Safety  
and Waterway Services

Encl: (1) CH-10 to COMDTINST M16500.7

B. 4. a. (5) (cont.) ties, the audio system is effective only as a warning device indicating proximity to navigational dangers.

(6) The use of radar aboard vessels offers additional navigation capability without resorting to the use of other electronic systems. This is accomplished either through the use of reflected radar signals (primary radar system) or signals transmitted (secondary radar system) from the aid.

b. Characteristics of the System.

(1) Types of visual, audio and radar signals:

(a) Visual

1 Daymarks

2 Retro-reflective signals

3 Lights

(b) Audio: Various non-directional sound producing devices.

(c) Radar

1 Reflectors

2 Radar beacon transponders (racons)

3 Shore based radar systems

(2) The characteristics of these types of aids in terms of availability are shown in Table 3-1, which also indicates the user equipment needed to make effective use of these aids.

(3) A basic requirement of an effective aid to navigation is that it be readily identifiable. Table 3-1 indicates the methods by which various aids to navigation can present unique identification signals to the mariner. To obtain optimum use from these aids to navigation, the mariner must have:

(a) Proper charts and appropriate light lists.

(b) Basic knowledge of the meaning of the various signal characteristics.

B. 4. b. (4) Chapter 4 presents criteria for employment of various types of aids. Chapter 4 should be consulted to ensure that the individual aids intended for a system under consideration will be:

(a) Standardized, insofar as is practicable.

(b) Established in sufficient numbers and spacing to provide desired system capabilities.

(c) Not unnecessarily duplicated.

(5) From the capabilities listed in the previous paragraphs, a type of signal that will satisfy the needs of the mariner can be identified. Having identified the proper signal, the next step is to design the system so that the information is provided to the mariner at the time, and in the place required.

C. Review And Modification Of Aids To Navigation Systems.

1. District Review.

a. District commanders shall schedule all critical waterways for analysis at least once every three years. Non-critical waterways must be scheduled but the scope of the documentation required is only enough to validate the non-critical designation. Each analysis should be formatted in accordance with enclosure (5). District Commanders (oan) approve all WAMS Analysis. Include a brief (1-2 page) Executive Summary of the Analysis and approved recommendation. Forward a copy of all critical analyses to Commandant (G-NSR). Districts shall maintain a copy of all analyses. Each review will ensure that:

(1) The aids are required as necessary elements in an aid system.

(2) Changes to augment and/or reduce aids are made when needed to conform to changes in hydrography and marine traffic.

(3) The aids conform to the criteria set forth in the foregoing sections of this chapter.

(4) Individual aids as well as entire aid systems provide required operational characteristics as specified in Chapter 4.

(5) Waterways are categorized into one or more of the following:

- D. 4. e. (4) environment for all standard aid types. Section A.5. of this chapter defines the environmental category terms.
- (5) The effects of ice during the winter and frequent heavy rain squalls during the summer also dictate aid mix. Unlighted buoys, which have a tendency to surface through the ice, may be necessary in the former case. Racons might prove useful in the latter case when all but the strongest of radar signals might be covered by return from a heavy squall.
- f. Due to the significant potential for loss of life caused by bridge allisions, approaches to bridges over the water must receive careful attention. This includes highway and railroad bridges over waterways marked with aids to navigation and over adjoining waters. The following guidelines may be helpful:
- (1) Coordinate ATON system design with district bridge administration officials. Considerations include existing bridge marking (e.g. lighting, retro-reflective panels, racons), physical characteristics of the bridge (e.g. height, span width), extent of fendering systems, and types of waterway traffic. ATON systems should facilitate safe transit of vessels on the centerline of main channels approaching bridges.
- (2) Where bridges cross over waters adjoining waterways marked with aids to navigation, consideration must be given to the accessibility of these waters from the marked waterways and the possibility of their use by traffic as alternate routes or as staging areas. The use of All Waterways Warning Markers may be appropriate in these areas where bridges may pose a hazard to vessel activity.

## 5. Simulators.

- a. Using simulators to analyze aid configurations will be more common in the future.
- b. At the very least, simulators can provide a good overview of aid effectiveness in a waterway during daytime and for a clear night. A marine simulator is operated and maintained by the Office of Marine Safety, Security, and Environmental Protection (G-M) at Coast Guard Headquarters. Other operations permitting, it could be used by a district to evaluate a proposed change to an aid system. Contact G-NSR to check on availability:

E. Short Range Aid System Configuration and Design.

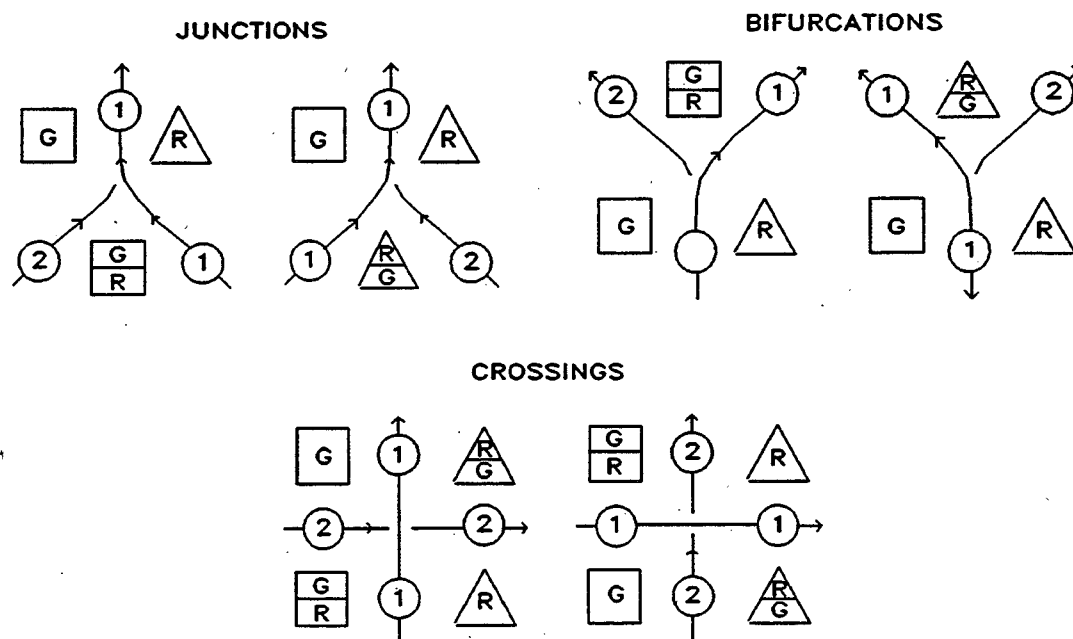
1. General. The short range aid system consists of four sub-systems. They are daytime visual, nighttime visual, radar or reduced visibility, and sound systems. Characteristics of each sub-system are:
  - a. The daytime visual system consists of the daymarks of beacons and buoys.
  - b. The nighttime visual system consists of lights and retroreflective signals.
  - c. The radar system consists of radar reflectors, racons, and shore-based radar systems.
  - d. Sound systems consist of various non-directional sound producing devices.

Since the above systems are collocated, they must be designed or evaluated concurrently. Guidelines for the use of major lights, ranges, LNB's, racons, and sound signals have been provided earlier in Section D of this chapter. The following more specific guidelines should help determine the needs for the two largest categories of short range aids: beacons and buoys.

2. Procedure for Marking. Whether designing a new system or evaluating an existing one, there are many factors to be considered. The following procedure is intended to promote a systematic review of each of these factors, resulting in a thorough treatment of even the most complex situation. These steps parallel those presented in the SRA Systems Design Manual. Both sources describe valid aid to navigation system analysis procedures.
  - a. Determine the Conventional Direction of Buoyage (CDB): Direction of flood and ebb currents throughout U.S. waters have been determined by NOAA and are usually available in current charts and tide tables. This information, as well as coastwise and Great Lake conventions provided in 33 CFR, defines our conventional direction of buoyage for assigning lateral markings. The designer should indicate the direction of buoyage on his working chart, paying particular attention to intersections, islands, and headwaters where currents meet and part.
  - b. Mark the Approaches: The approach to any restricted waterway is usually classified as a bay, sound, channel, inlet or strait. The aid systems in these regions consist of mixtures of radio aids and short range aids. Several procedures are used for marking in this area:

- E. 2. b. (1) Short range aids in this region conform to the conventional direction of buoyage and usually mark good water.
- (2) Traffic separation schemes (TSS) may be found in this area. Aids marking a TSS are special purpose, with the most seaward aid usually being an LNB or safewater mark.
- (3) Wrecks and obstructions should be marked if the traffic situation so dictates.
- c. Prioritize Channels: When more than one channel needs marking, they should be ranked by order of importance. This ranking is usually based on width, depth, and predominant traffic flow. Draw a continuous line, numbered "1", down the center of the primary channel in the direction of buoyage, as in Figure 4-1. Continue with each subsequent channel, leaving short gaps where a subordinate waterway crosses or intersects one of a higher priority, until all are drawn and numbered. With one exception, you should prioritize the ICW based on its importance relative to other proximate waterways, and not necessarily downgrade it to the lowest ranking. For example, there may be places where the ICW is deeper or supports a higher volume of traffic than a nearby non-ICW waterway. The exception arises when the conventional direction of buoyage for the ICW runs opposite to that of the normal waterway. In that case, the normal waterway must have a higher priority than the ICW.
- d. Channel Subdivision. When conducting an aid system design or evaluation, it is helpful to now divide the channel or waterway into regions according to the unique requirements of the maneuvering tasks for each. These descriptive maneuvering tasks are: turn, recovery (from a turn), and trackkeeping.
- (1) A turn region should generally extend a half mile either side of the apex of the turn. Different turn types, such as cutoff, non-cutoff, or bends, require that the designer use discretion when establishing region boundaries. The constraining consideration should be the desire to enclose the area in which the navigator is actually executing the turn.
- (2) The recovery region, as the name implies, should enclose the area, immediately following a turn, which is needed to regain a steady heading. Research has shown this distance to be approximately three quarters to one and one-half

- E. 2. d. (2) miles. A shallow turn, 15 degrees or less, would require the shorter distance for recovery, while a larger turn, up to 35 degrees or more, would require a greater distance to regain track. Vessel size is also an important variable in delineating recovery region distances, with larger vessels, 50K DWT or greater, needing larger distances to regain track.
- (3) The remaining portion of the waterway necessarily becomes the trackkeeping region.
- (4) These regions should be plotted directly on the chart showing the channel under consideration. Figure 4-2 illustrates the technique. This is especially useful when evaluating the interaction between regions later.



NOTE: There is no requirement to mark all three or four corners of the intersections.

FIGURE 4-1



## CHAPTER 7. GENERAL OPERATION INSTRUCTIONS FOR AIDS TO NAVIGATION UNITS.

### A. Introduction.

#### 1. Types of Units.

- a. Watched aids are units with resident personnel responsible for continuous attention to the operation of an aid to navigation. Loran stations, though watched, are not discussed in this manual. Details regarding the operation of watched units are discussed in Chapter 8.
- b. Servicing units are responsible for periodic maintenance of unwatched aids to navigation. Buoy tenders, aids to navigation teams (ANT's) and trained personnel stationed at various units have these responsibilities. A unit may operate a watched aid in addition to servicing other aids in the vicinity. Details regarding the operation of servicing units are discussed in Chapter 9.

### B. General Instructions for Aids to Navigation Units.

1. Inspection. The term inspection means to view or examine closely and critically the operating features and methods, care and upkeep, administration, and general overall efficiency of an aid to navigation.
  - a. Watched Units. The district commander shall require a thorough general inspection of each watched aid to navigation annually. Inspection checkoff lists prepared by the district staff shall be used as criteria.
  - b. Unwatched aids. Inspection of unwatched aids shall be conducted during routine visits. Required corrective and/or preventive maintenance, which may include items such as replacing retro-reflective material, light and/or fog signals, painting and recharging shall be accomplished. Inspection of formally watched lights for structural integrity shall be conducted in accordance with the Lighthouse Maintenance Management Manual (COMDTINST M16500.6).
- B. 2. Discrepancy. Failure of an aid to provide advertised light, sound signal, appearance or position as described in the Light List or on charts is a discrepancy. Whenever a discrepancy or damage to an aid is found by or reported to a Coast Guard unit which cannot immediately effect repairs, the district commander shall be notified

- B. 2. by message. The report shall state the exact nature of the discrepancy and corrective action taken. If corrective action is beyond the capabilities of the unit, the report shall include this fact. If the damage or destruction is the result of collision and/or vandalism, the reporting unit shall make every reasonable effort to obtain complete information regarding the situations. (For more information on vandalism see paragraph B.6 of this chapter). If available, report the names and addresses of the vessel or persons involved, including witnesses. Consult Chapter 10 for information on action to be taken in correcting various types of aid discrepancies.
3. Tolerances. The maximum allowable tolerance for light or sound signal rhythm characteristic is  $\pm 6\%$  of the specified value per period, or 3.6 seconds per minute, whichever is smaller. For revolving lights the tolerance is 3.6 seconds per minute. No tolerances can be prescribed for the positioning of buoys that would be applicable in all situations. The preciseness with which a buoy is positioned is determined by many factors but the ultimate test of the adequacy of any buoy's position is: "Does the buoy adequately serve its intended purpose as portrayed on the largest scale chart and in the Coast Guard Light List?" See Volume 5 for detailed information on buoy positioning.
4. Discrepancy Buoys. Discrepancy buoys may be used to temporarily replace damaged or missing buoys or structures until the discrepancy can be corrected. Discrepancy buoys are used to allow a tender to complete scheduled servicing runs or in-port routines rather than to immediately respond to discrepancies which may be located many miles from the area then being serviced by the tender. Discrepancy buoys may have less signal capability than the aids they replace. Action should be initiated to restore the damaged or missing aid whenever a tender becomes available in the area of the discrepancy without seriously affecting the vessel's routine schedule. See paragraph C.5. of Chapter 3 for more information of temporary aid changes.
5. Unauthorized Changes In Aids. Except in an emergency, each aid shall conform to its current Light List (corrected to date) description. Where deviations from the Light List must be made in emergencies, they shall be reported immediately to the district commander. Another report shall be made when the aid is restored to its authorized condition.
6. Vandalism. Thousands of dollars worth of aids to navigation equipment are ruined each year by vandals. Through vandalism the Coast Guard not only loses valuable

B. 6. equipment but many hours are wasted in repairing damaged and destroyed aids or searching for sunken buoys. In addition to these losses, discrepancies in the aid system caused by vandals could result in injury to mariners as well as damage and loss to vessels and property. Experience and studies have indicated that vandalism is usually centralized in one or more small areas in each district during specific times of the year, i.e. hunting season, school vacation, etc. District, group and local unit commanders shall take vigorous measures to curb vandalism by employing the following:

- a. Where vandalism is centralized, inform the District Intelligence and Law Enforcement Branch of the vandalism, listing the various acts and providing as much information as possible.
- b. Conduct a public information effort in the area by providing articles to the local news media with particular attention paid to school newspapers or hunter's digests, etc., stressing the possible harm and definite expense caused by vandals.
- c. Post official Coast Guard aid to navigation warning signs throughout the area. Attempts should especially be made to place the signs at boat launching ramps, marinas, sporting goods shops or other places where potential vandals or witnesses to vandalism might congregate.
- d. Stress the penalties that could result from the theft, damaging, defacing, destroying or interfering with aids as provided in 33 USC 411; 18 USC 641, 1361, 1363; and 14 USC 84. The maximum penalties upon conviction, depending upon the statute, are a maximum of five years imprisonment and a \$2,500 fine. Also stress the rewards payable to persons giving information leading to conviction, of one half the assessed fine (33 CFR 70).

C. Servicing Policy.

1. Frequency of Relief of Buoys.

a. Steel Buoys.

- (1) Six years is the minimum on-station period of all steel buoys except where earlier relief is dictated by unusual circumstances. Relief intervals should be extended beyond six years where possible. Normally, buoys shall be relieved only when a servicing unit can no longer maintain the buoy as an effective aid to the mariner.

C. 1. a. (2) See Volume 3 for detailed maintenance instructions.

b. Plastic and foam buoys .

(1) Plastic and foam buoys shall remain on-station as long as they can be maintained by a servicing unit and serve as an effective aid to navigation. They should not be relieved or returned to a base unless they are damaged beyond a servicing unit's ability to patch, paint or repair them.

(2) See Aids to Navigation Manual - Technical for detailed maintenance instructions.

2. Frequency Of Routine Visits.

a. Aids On Fixed Structures.

(1) Routine visits to lighted aids on fixed structures and to beacon structures, other than those listed in paragraph d. below, shall be scheduled as determined by the servicing unit using the ATON Servicing Interval Flowchart (ATON SIF) provided in this chapter. Routine visits will be made at least biennially (every two years). A variation of up to two months to coordinate servicing trips is allowed. Inspection of the aid shall be the purpose of the visit.

b. Buoys.

(1) Routine visits to buoys shall be scheduled as determined by the servicing unit using the ATON SIF provided in this chapter. Routine visits will be made at least biennially (every two years). A variation of up to two months to coordinate servicing trips is allowed. These visits will be for the purpose of inspection.

(2) A buoy's position shall be checked each time it is serviced and an on/off station determination made in accordance with the Aids to Navigation Manual - Positioning.

(3) Battery recharging cycles shall coincide with inspection visits, mooring inspections, or reliefs to the maximum extent possible. The effective use of vessel operating time, however, has priority over the economics of using all power available from batteries. The Aids to Navigation Manual - Technical, Chapter 9 shall be used as a guide for determining appropriate rated battery discharge times.

- C. 2. b. (4) Lifting buoys from the water shall be avoided except as required for inspection of moorings, relocation, relief, recharge, or correction of a discrepancy. Inspection of the underwater portion of buoy hulls shall be accomplished in conjunction with scheduled mooring inspections. Inspections that do not require lifting of buoys shall be accomplished, where feasible, by small units such as Aids to Navigation Teams or by the most economical means available.

c. Mooring Inspection.

- (1) Two years is the normal period between mooring inspections for all buoys. These inspections, to examine the underwater body, mooring, and associated components, should be extended beyond two years where possible. The period will be determined based on the buoy's location and its historical data. However, in known areas of accelerated chain wear, such as areas exposed to the full force of the seas, inspections will be conducted as frequently as is deemed necessary by the servicing unit.
- (2) When chain is used, greater chain size than ordinarily recommended (in Volume 3) may be used when this will allow the mooring to remain on station two years or more. This heavier chain must not materially affect the signal characteristic of the buoy.
- (3) The sinker, or anchor, need not be lifted off the bottom unless its condition, or the condition of that part of the mooring that touches the bottom, is questionable.

d. Watched/Monitored Aids

- (1) Aids of such importance that they must be continually watched or monitored, either electrically or electronically, ordinarily require servicing visits more often than every 12 months.
- (2) Similarly, aids composed of one or more of the below types of equipment generally require servicing visits more often than once every 12 months.
  - (a) Sound signals requiring a power source in excess of 12 volts.
  - (b) Engine generators as primary or secondary power sources.

C. 2. d. (2) (c) Trickle charged batteries used as a secondary power source to commercial power.

(d) Category I, II and III solar powered lighthouses and ranges with comparable power systems should be visited semiannually.

e. Waterways.

(1) Each waterway shall be visited by a qualified Coast Guard ATON member from the primary servicing unit at least once a year. The district commander may adjust this schedule for special cases. These visits can be in conjunction with the inspections listed previously. Alternate visits should be during nighttime hours. The purpose of these visits is the overall assessment of all the aids to navigation in the waterway, their proper operation, physical condition and their ability to meet the needs of the mariners. All ranges in the waterway shall be run and their Light List advertised values checked. Such a visit will be logged by the servicing unit, whether an afloat or a shore unit, in an appropriate manner.

(2) When scheduling permits, representatives of the group commander, the secondary servicing unit and local users should be invited to accompany the servicing unit during the waterway visits.

3. Component Service Period.

a. All aids to navigation should, ideally, have components which are designed to provide trouble free operation without service or maintenance for two years or longer.

b. District commanders shall implement a program to extend the service of, or eliminate, as many items of equipment as possible which require routine maintenance more often than once every 24 months.

4. Trends Toward More Frequent Visits.

a. The preceding sections specify scheduling of relief and routine visits to aids to navigation. Aids that cannot meet the servicing intervals prescribed herein may be placed in a schedule corresponding to their expected endurance.

b. Problems causing a trend to more frequent visits than prescribed shall be identified. Solutions to these

- C. 4. b. problems such as relocation, change of aid type, change of equipment, or elimination of the aid station shall be considered before assigning a more frequent visit schedule.
- c. The Commandant (G-NSR) shall be advised of any trend causing visits to aids more frequently than prescribed and of proposed solutions to the problem.

5. Additional Guidelines.

- a. District Commanders (oan) and ATON units should aggressively pursue extending ocean buoy, minor light and beacon servicing intervals, but also must recognize that there are locations where it would not be prudent. District Offices and ATON units are empowered to use their best local judgment in making these determinations, using the ATON SIF as a guide.
- b. Following the standardized procedure(s) recommended in the accompanying ATON SIF, each USCG ATON servicing unit shall review and analyze each nonseasonal ocean buoy and beacon structure assigned. The servicing unit Commanding Officer/Officer-in-Charge shall make a determination, based on the ATON SIF review, and local knowledge and judgment, and assign a routine servicing interval for each aid. A new SIF worksheet must be completed each time a servicing interval is changed. A brief explanation should be entered in the comments section of the SIF whenever a servicing interval shorter than two years is determined. The SIF should be reproduced locally and maintained in the aid file.
- c. Scheduled recharges (replacements) for aid batteries should be determined based on the rated battery discharge time (in the case of primary batteries) or maximum service life (in the case of secondary batteries) as published in the ATON Technical Manual, M16500.3 (Series). All planned recharges shall coincide with the aid's routine servicing interval; batteries lacking sufficient remaining service life to reach the next regular service visit shall be replaced. The cost of discarded remaining battery life is minuscule compared to the cost of a service visit.
- d. Whenever possible, ATON inspections and servicing operations should be accomplished by the least expensive available resource.
- e. District Commanders (oan) should recommend appropriate reallocation of ATON resources, to units (such as ANTs), that perform increased ATON services as a result of these guidelines.

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# AIDS TO NAVIGATION SERVICING INTERVAL FLOWCHART (ATON SIF)

Name of Aid : \_\_\_\_\_

Aid # (from ATONIS) : \_\_\_\_\_

ATON Unit : \_\_\_\_\_

Decision Date : \_\_\_\_\_ Made by : \_\_\_\_\_  
name (rank or rate)

Results (from use of flowchart) :

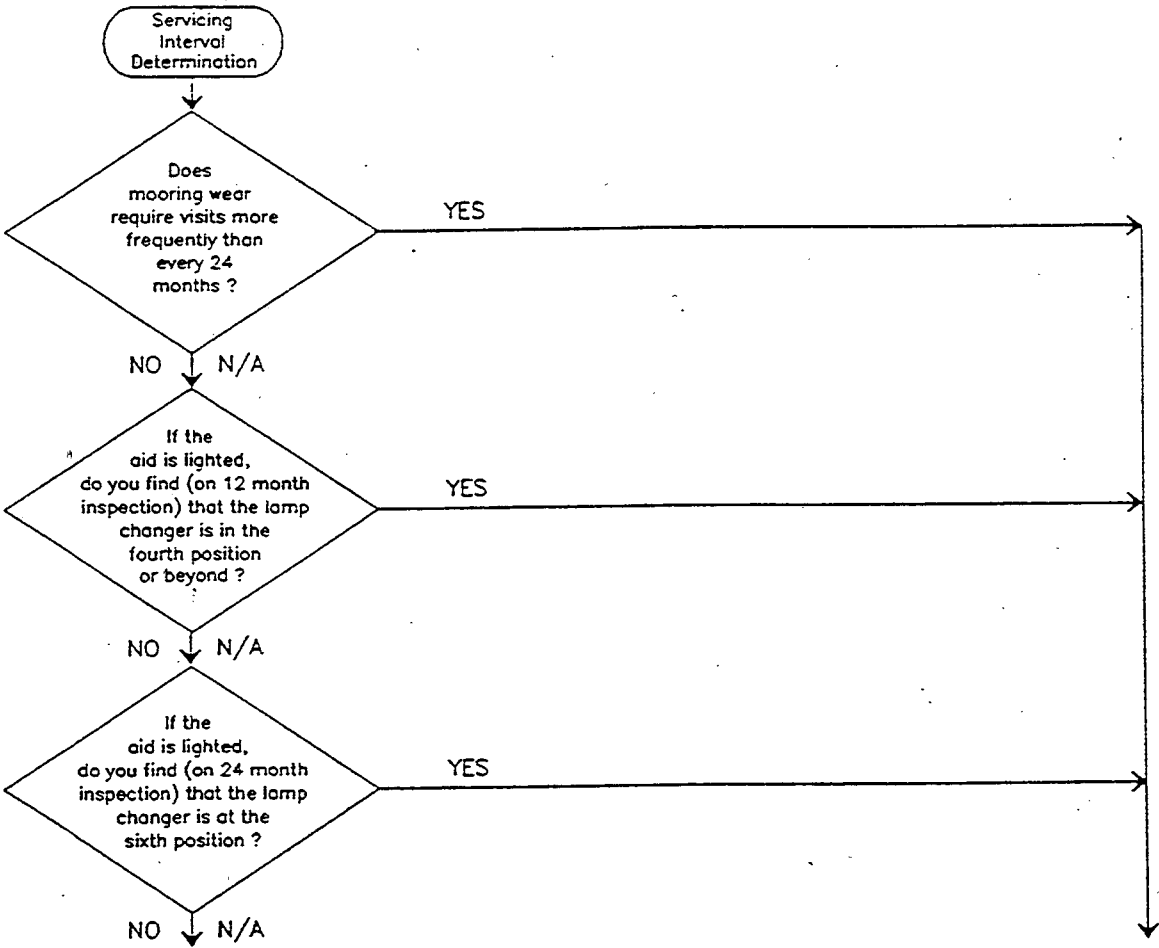
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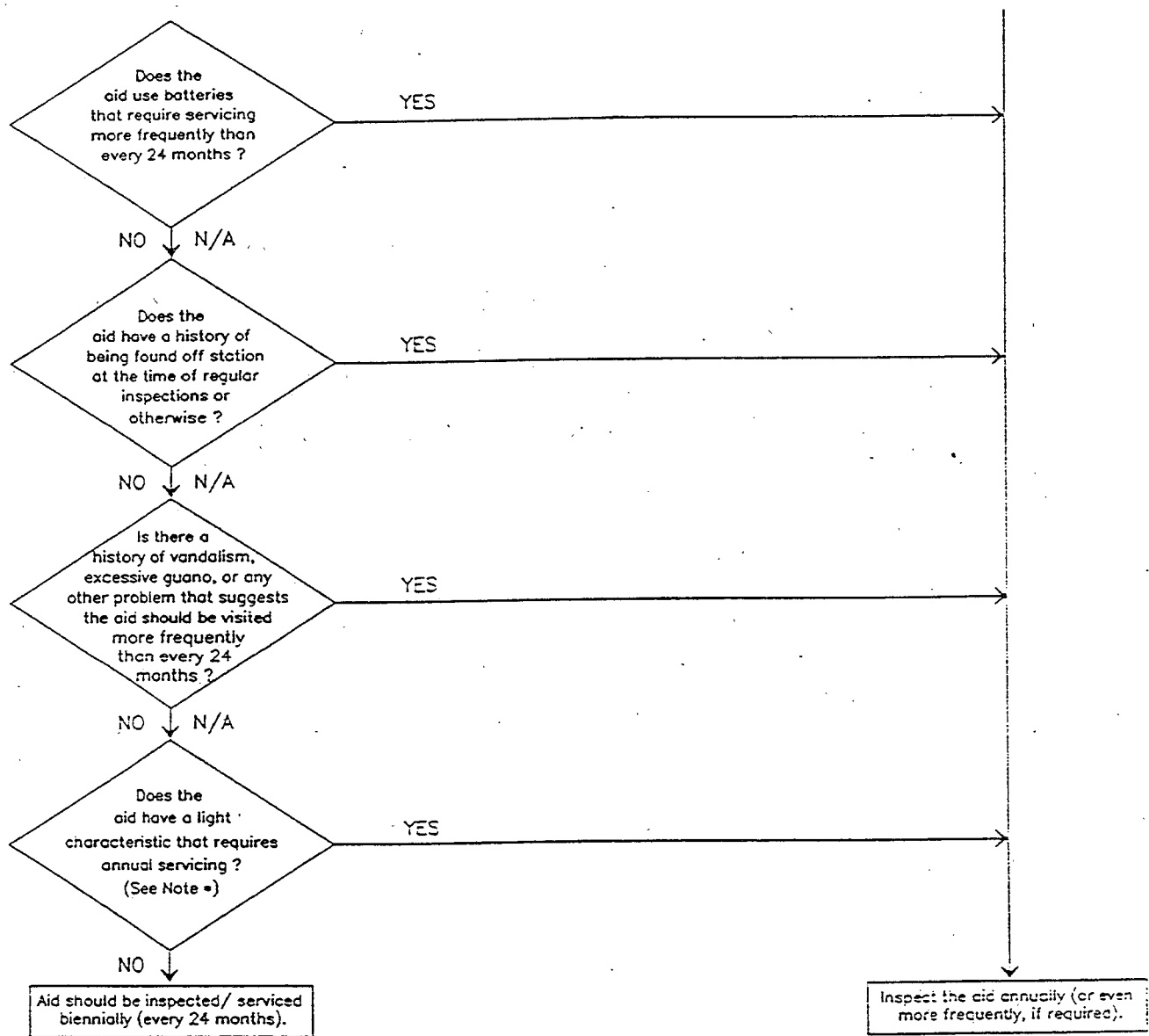

A. Do routine inspection:

- ☐ annually
- ☐ biennially (24 months)

B. Do mooring inspection :

- ☐ annually
- ☐ biennially
- ☐ other \_\_\_\_\_





#### Instructions:

- This form should be used to evaluate non—seasonal ocean buoys, day beacons and minor lights.
- Whenever possible, ATON inspections and servicing operations should be accomplished by the least expensive available resource.

Note \*: See ATON Manual—Technical (COMDTINST M 16500.3) Chapter 9, Table 9-2.



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